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NEW MACHINES FOR RESISTANCE WELDING

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In 1949, the "Elektrik" Plant began to manufacture the new butt, seam, and spot welding machines, described below.

Type MSR-100

This machine is designed for electric resistance butt welding both by the resistance method and the flash method. It has a manual lever drive mechanism and universal lever screw, radial clamping devices.

Technical data on the machine is as follows: primary voltage, 220, 380, 500; repeated short-time duty rating, 100 kilovolt-amperes for 20 percent operating cycle, 20-30 welds per hour, and a welding cross section of 1,000 square millimeters; maximum cross section for welding low-carbon steels, using an interrupter, 2,500 square millimeters; secondary voltage, 4.5-7.6; number of steps, 8; consumption of cooling water, 200 liters per hour; feed travel, 40 millimeters; maximum separation of the jaws, 85 millimeters; weight, 1,360 kilograms; dimensions (height, width, depth) 1,330 x 1,810 x 1,410 millimeters.

The machine has a horizontal table with a movable cast-iron plate on the right side and an immovable one on the left. Copper inserts in sockets are attached to the plates and connected to the terminals of the secondary turn of the welding transformer. The inserts and adjacent parts are cooled by running water.

Clamping devices are fastened to the cast-iron plates in T-slots by slide-blocks with studs, tightened with cap nuts. They are easy to operate and permit a sufficiently firm pressure on the work piece to weld rods, strips, rims, etc., without using supports. To prevent slippage while welding larger cross sections of 1,500 to 2,500 square millimeters, provision is made for additional

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clamping pressure by means of a hexagonal [illegible] on top of the machine. During mass production of a single type of weld [illegible] prevent wear on the clamping jaws it is advisable to use insulated supports which can be installed on the plates of the clamping devices.

Type MShP-100

These machines are designed for electric resistance welding for both transverse and longitudinal seam welding of low-carbon, heat-resistant and nonmagnetic steel parts, and also for welding aluminum and its alloys. The MShP-100 machines, rated at 100 kilovolt-amperes for 50 percent periodic duty, are made in four versions: the MShP-100-1 for transverse seam welding with an 800-millimeter overhang of the welding rollers; the MShP-100-2, also for transverse seam welding with a 500-millimeter overhang of the welding rollers; the MShP-100-3 for longitudinal seam welding with an 800 millimeter-overhang; and the MShP-100-4, the same as the MShP-100-3; but with a 550-millimeter overhang of the welding rollers.

The MShP-100 has a pneumatic drive to produce pressure and a mechanical forced drive on one of its welding rollers. In the machines for transverse seam welding; the forced drive is on the lower welding roller, while in the machines for longitudinal seam welding, the drive is on the upper roller.

Machines of this type can weld sheet metal to a seam length double the length of the overhang (1,600 and 1,100 millimeters, respectively). The maximum diameter and length, respectively, for cylindrical parts to be welded are as follows (in millimeters): (1) transverse seams -- 120 and 160, or 135 and 520; and (2) longitudinal seams -- 135 and 160, or 300 and 520.

Since a high-grade seam can be obtained by the intermittent welding method, each machine is supplied with an ignitron interrupter and an electronic synchronizer. By means of the latter, it is possible to ensure convenient regulation of the working cycles even while the welding itself is proceeding. Technical data on the ignitron interrupter follows: welding pulses in one period, 1 to 10; "break" pulses in one period, 1 to 17; limits of power control, 40-70 percent; consumption of cooling water, 120 liters per hour; weight, 250 kilograms; dimensions (height, width, depth) 2,000 x 800 x 900 millimeters.

The special design features include the following:

1. Ease in regulating and adjusting the pressure between the welding rollers, assuring constant pressure regardless of the wear on the rollers or fluctuations in the compressed air pressure in the line.

2. The dead weight of all mobile parts of the machine is balanced, while the pressure head, together with the electrode section, plays no part in the welding pressure.

3. Provision for regulating the smoothness of up and down motion of the upper welding roller as well as the distance between rollers.

4. Provision for regulating the power of the machine both at the welding transformer, by means of an eight-step switch, and through an interrupter which controls the current in the ignitrons over the intervals from 40-100 percent of the periods.

5. Welding pressure, which can be regulated between 30 and 1,000 kilograms, does not affect the current-carrying sections.

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6. Tubular framework consisting of four tubes which, at the same time, serve as receivers for the pneumatic devices,

7. A continuously variable speed regulator with a V-belt is used in the drive mechanism of the welding roller.

8. The internal water cooling is supplemented by external water cooling from below and above the welding area; a trough is provided to drain off this water.

The shell-type welding transformer is built into the machine framework, and bolted to the upper angles of the frame where it can be readily inspected. All control and adjustment mechanisms are accessible through three doors (one on each side and at the rear).

The main control of the machine is a special electric drum-type pedal with a ratchet gear. The order of operations is as follows:

1. When the pedal is first depressed, pressure is exerted on the work piece between the welding rollers (through the lowering of the upper roller). If the position of the piece is not right, the pedal must be left as is and the knob of a switch located on the right side of the upper arm is flipped downward which causes the welding roller to rise. After the work piece has been placed in the required position, the switch knob is flipped upwards and the welding roller then drops.

2. When the pedal is depressed the second time. the welding roller drive is connected in, followed by the application of welding current.

3. When the pedal is depressed the third time (on completion of welding), the welding current is first switched off; then the welding roller drive turns off and, at the same time, the upper welding roller rises, i.e., the pressure is removed.

Technical data on the machines is as follows: primary voltage, 380; rated power 100 kilovolt-amperes for 50 percent operating cycle; secondary voltage, 3.5-6.3; regulating steps, 8; welding pressure, 800 kilograms; travel of upper welding roller, 50 millimeters, welding speed with smooth control, 0.5-1.5 meters per minute; total thickness for welding low-carbon and stainless steels, 0.5+0.5 to 2+1.5 millimeters required air pressure, 5 atmospheres; motor size, 0.55 kilowatts; consumption of cooling water, 745 liters per hour; weight, 1,870 kilograms; dimensions (height, width, depth) 2,150 x 1,000 x 1,750 millimeters.

Type MTPG-75 Suspension Machines

This type is designed for automatic electric resistance spot welding either with separate welds or a consecutive row of spot welds. Welding can be done manually on both immovable work pieces or movable ones on a conveyer. The output of the machine is 40 to 100 spot welds per minute depending on the surrounding temperature, in particular, the temperature of the oil in the hydraulic drive system.

Basically, the suspension machine consists of a shell-type, single-phase, welding transformer with "disk-type" primary and secondary windings secured by two Silumen covers. A pneumatic-hydraulic device converts the low pressure of the air-supply lines to high fluid pressure which is delivered to the hydraulic cylinder of the tongs through hose connectors. An electric push button on the tongs activates a timing device which controls an electropneumatic valve.

It is possible to obtain 16 values of secondary no-load voltage by means of a two-pole switch and a sectional arrangement of the secondary which permits series or parallel connection.

The welding transformer is connected with the tongs by a special multistrand low-reactance cable which is cooled by running water. The transformer with attached parts is supported by means of a suspension of special design. Its weight is balanced by the weight of the tongs and connecting cables.

The high productivity of the machine, the ease of regulating it, and the complete automatization of each cycle not only for separate but also for a consecutive row of spot welds all stem from the fact that the electric system of the machine has a quadruple-range electronic timing regulator (Type RVE-5) to control the electrode compression time, welding time, peening time (cooling the metal) and the intervals between welds in continuous spot welding.

Technical data on the MTPG-75 machine follows: primary voltage, 220 or 380; rated power, 75 kilovolt-amperes for 25 percent operating cycle; secondary voltage; series connection of secondary winding, 10-20 volts; parallel connection, 5-10 volts; control steps, 16; maximum travel of electrodes, 25 millimeters; maximum pressure between electrodes, 250 kilograms, maximum thickness for welding parts of low-carbon steel, 1.5-1.5 /sic/; maximum compressed air pressure, 4.5 atmospheres; maximum air consumption, 3 cubic meters per hour; consumption of cooling water, 600 liters per hour; ratio between pressure in air line after the receiver and pressure in hydraulic circuit, 1:19; weight, 350 kilograms; dimensions of control box, 775 x 725 x 405 millimeters; dimensions of timing regulator, 400 x 325 x 175 millimeters.

/Original document, available in CIA, shows photographs of the Type MSR-100, MShP-100-1 and 3, and MTPG-75 machines, the ignitron interrupter, and detail sketches of the welding tongs for the Type MTPG-75-2 and four spot welding machines./

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